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CONTENTS

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	PAGE
Notes on Captive-bred Ostriches at the Basel Zoological Garden (*with plate*), by Dr. H. WACKERNAGEL	113
On the Display and Breeding of the King Bird of Paradise, *Cicinnurus regius rex* (Scop.) in Captivity (*with plates*), by S. BERGMAN	115
Malachite-crested Kingfishers (*Corythornis cristata*), by J. M. SPENCE	125
First Breeding in Captivity of the Severe Macaw (*Ara severa* (Linnaeus)), by O. HIRTHE	126
Notes on the Dark Fire Finch (*Lagonosticta rubricata*), by C. J. O. HARRISON	128
Breeding Zosterops, by A. A. CLARENCE	131
British Aviculturists' Club	133
Breeding the Star Finch or Ruficauda (*Bathilda ruficauda*), by N. GRAVEM	134
The Story of a Lapwing, by A. A. CLARENCE	136
Successes and Failures of a Scottish Aviculturist, by T. SPENCE	137
London Zoo Notes by J. J. YEALLAND	139
News and Views	140
Reviews	142
Notes	144
Correspondence	144

VOL. 63 No. 4 PRICE 5/- JULY–AUGUST 1957

THE AVICULTURAL SOCIETY

Founded 1894

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THE AVICULTURAL MAGAZINE

The Magazine is published bi-monthly, and sent free to all members of the Avicultural Society. Members joining at any time during the year are entitled to the back numbers for the current year on the payment of subscription. All matter for publication in the Magazine should be addressed to :—

The Editor : Miss Phyllis Barclay-Smith, 51 Warwick Avenue, London, W. 9. Telephone : Cunningham 3006.

The price of the Magazine to non-members is 5s., post free, per copy, or £1 10s. for the year. Orders for the Magazine, extra copies and back numbers (from 1917) should be sent to the publishers, Stephen Austin & Sons, Ltd., Caxton Hill, Ware Road, Hertford, England. Telephone : Hertford 2352/3/4.

[*Hoffinger.*

THE OSTRICHES AT THE AGE OF SIX MONTHS.

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AVICULTURAL MAGAZINE

THE JOURNAL OF THE AVICULTURAL SOCIETY
AND THE AVICULTURAL SOCIETY OF AMERICA

Vol. 63.—No. 4.—*All rights reserved.* JULY–AUGUST, 1957

NOTES ON CAPTIVE-BRED OSTRICHES AT THE BASEL ZOOLOGICAL GARDEN

By Dr. H. WACKERNAGEL (Basel, Switzerland)

During 3rd–9th September, 1956, eleven healthy Ostriches were hatched at the Basel Zoo after an incubation period of 47–53 days. The clutch of sixteen eggs was incubated by the parent birds themselves. Seven eggs were placed in an incubator after 38, and the remaining eggs after 48, days of incubation, because of the cold and rainy weather. Four eggs did not hatch. They proved to be infertile or contained dead embryos. One Ostrich hatched under the parents was found dead in the nest. The newly hatched chicks were placed in a modified poultry house which serves mainly for raising birds. It has a wooden floor, big windows to the south, and access to a lawn. The floor was covered with sand and the room was heated by infra-red lamps to a temperature of 25°–30° C. At the beginning the temperature was never allowed to fall below 20° C. The little birds soon seemed to find places under the lamps where they felt comfortable. They were left without food for about two days, then dishes were put before them containing chopped fresh alfalfa, carrots, leaves of dandelion and, at times, lettuce. In addition, they were given a pelleted all-mash mixture designed for pullets, containing about 14 per cent of crude protein, Spratt's Weetmeet, some hard-boiled egg, and crushed Ostrich-eggshell. From the beginning the green stuff, especially alfalfa, was much liked but the pellets, too, were accepted in increasing quantities and we feel that we owe much of our success to this well-balanced diet. Water was offered about twice daily and the birds took to it most of the time, but we do not think that it is essential. At first the birds seemed quite avid for their own droppings but this habit was soon lost. Anyone who has tried raising Ostriches knows how much devotion and skill it takes to induce these birds to eat sufficient

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quantities of food. When left alone they will walk about, peck now and then at conspicuous objects, and finally die of starvation. In captivity someone has to take the place of a parent bird, not only during the first days but for a number of weeks, and knock at the dish or the floor where the food is placed, or move the food in the dish or let it drop in front of the birds, etc. It will pay to take this trouble. Of course, it is easier to raise a whole flock, but even so the mutual stimulation does not seem to suffice. I often put this sentence in my notes : " Now it seems that the birds will soon settle by themselves "—but invariably it proved necessary or at least advantageous to keep them company. By touching the bellies it was possible to find out if they were duly filled. It seems to be advisable to keep them company up to the age of about three to four months.

Our birds developed nicely and never caused much worry. On sunny days they were allowed to exercise freely in the open, which stimulated their appetite and made them less excitable. Furthermore, plenty of exercise seems desirable for sound development. On the lawn the birds revealed their herbivorous nature by pulling out and eating grass, denuding whole areas of growth down to the ground. Eating, sleeping, and preening were performed at regular periods. Feeding was most intensive during the two to three hours before sunset and stimulating the birds during this time of the day is considered most effective. In other words : the opportunity of obtaining full bellies in the evening should not be missed.

One of the birds was lost at the age of about three weeks. It had not eaten for about two days and the dissection revealed its intestines heavily filled with small pebbles. We do not know, however, if this was the actual cause of death.

When the birds were about two months of age the pellets could be offered dry in a separate dish and a calculated dose of a calcium-phosphorus-vitamin-D-preparation was given in addition. At that age the daily allowance per bird was about 1 kg. of chopped vegetables (mostly alfalfa) and about half a pound of pellets and Spratt's Weet-meet. The daily exercise on the lawn was never discontinued, in spite of the increasingly cooler weather and occasional fall of rain and snow. Cold alone did not seem to hurt the birds when they were exposed, as long as they kept moving. The birds obviously enjoyed these outings, mostly indulging in lively dances. Room temperature often fell below 20° C.

As the birds grew bigger enormous quantities of food were eaten. In December cabbage was introduced in place of alfalfa, which was not available any more, and the pellets were given as the only concentrate. Consumption then amounted to about 1 kg. of concentrate and at least twice that amount of vegetables per bird per day.

Dancing was often performed in the stable, too, which occasionally

caused skin lesions and bruises on the birds and broken windows in the building. The windows consequently had to be screened by wire netting. We did not worry about the birds' injuries at first, taking them as a sign of health and vigour, but after a while it became necessary to move the birds to larger quarters. In February the Antelope House became the new home of the birds, which had almost attained the height of a man. After a few days of excitement and decreased food consumption the Ostriches settled down nicely. Soon the appetite was regained and in March the daily consumption of each bird had risen to 2 kg. of pellets and about 7 kg. of vegetables. They continue to develop into splendid specimens, pleasing their keepers by their tame and mannerly conduct.

* * *

ON THE DISPLAY AND BREEDING OF THE KING BIRD OF PARADISE, *CICINNURUS REGIUS REX* (SCOP.) IN CAPTIVITY

By STEN BERGMAN (Rönninge, per Stockholm, Sweden)

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The King Bird of Paradise, *Cicinnurus regius* (Linnæus), is certainly one of the most magnificent birds of the world. The vermilion colouring of the head and upper parts of the body, shimmering with every movement, is of a supreme beauty. Even more remarkable are the adornments with which the male bird is furnished : the two superbly sweeping tail wires, each tipped with a gleaming, spirally curved disc. In addition, there are the brown, fan-like side-plumes bordered with emerald green, which lie folded under each wing and can be spread out at will.

Although the King Bird of Paradise was given its name by Linnæus in 1758, its life and habits in the tropical jungle are still very little known. When Hartert, in 1910, wrote an article about those Birds of Paradise whose eggs were at that time known (*Novitates Zoologicæ*, 17 : 484-490), he expressed his surprise that nobody had succeeded in finding the nest of *Cicinnurus*, since in certain parts of its range in New Guinea and on a few neighbouring islands the bird is not, after all, so rare.

At the end of March, 1929, however, Wilfred Frost discovered the first and, as far as I know, hitherto only known nest. This find revealed the quite unexpected fact that the King Bird was a hole-breeder in contrast to all other species of Birds of Paradise, which have open nests. The nest found by Frost was built in a small tree, about 7 feet from the ground. He describes the nest as follows : " The nest hole

was small, about 1½ inches in diameter, and approximately 18 inches deep, but filled to within a few inches of the lip with palm fibre. The eggs, two in number, measuring 27·5 × 21 mm., were of a creamy white, flushed with pink, typically marked and curiously resembling, except for size, those of *Paradisæa apoda*." (*Avicultural Magazine* (4), 8: 33–5, 1930.)

The first live Birds of Paradise which came to Europe—two *Paradisæa minor*—were brought home in 1862 by Alfred Russel Wallace and placed in the London Zoo, where a number of different species have since been kept, as in many other Zoological Gardens.

Up to the present, no Bird of Paradise has been bred in Europe, although some instances of egg-laying have occurred. As far as I know, the only species which has ever successfully bred in captivity before 1956 is " Empress of Germany's Bird of Paradise " (*Paradisæa apoda augustævictoriæ* Cabanis), of which in 1942 one young was reared in Prince Dharmakumarsinhji's aviarium in Bhavnagar, India (*Zoologica*, New York, 28: 139–144, 1943). In the Zoo of Surabaia, on Java, a King Bird of Paradise, according to Frost, laid two eggs which were hatched out, but the young died in the nest. The same female later laid one more egg but failed to incubate it (*Avicultural Magazine* (4), 8: 33–5, 1930). This, as far as I know, is the only attempt made by a King Bird to breed in captivity before 1956.

When returning to Sweden from two journeys to Dutch New Guinea, in 1948–49 and 1952–53 for ornithological research, I was permitted by the Dutch authorities to bring to Sweden a number of live Birds of Paradise for the purpose of continuing my studies and observations on these birds and, if possible, to make breeding experiments with them. For my first permit I am much indebted to my colleague of the 1948–49 expedition, Dr. M. A. Lieftinck, then Director of the Zoological Museum in Bogor, Java. For my second permit I have to thank H.E. the Governor of Dutch New Guinea, Dr. J. van Baal, the former resident of West New Guinea, Mr. L. L. A. Maurenbrecher, and Professor Dr. L. F. de Beaufort.

Among my Birds of Paradise were some male King Birds, *Cicinnurus regius rex* (Scopoli). I did not, however, succeed in bringing home any female of this species, but through the courtesy of Director S. van Reesema and Ir. F. J. Appelman, of the Rotterdam Zoo, I was permitted to exchange one male *Cicinnurus* for a female of the same species.

In October, 1955, this female was joined with a male that had just changed its plumage and the pair was allotted a space of 17½ m^3 in my house. The room was planted with a number of *Monstera*, *Ficus*, *Bougainvillea*, and other tropical plants. The floor was covered partly with sand and partly with moss. The room had a constant temperature of 25° C., regulated by thermostat, and the necessary moisture was

effected by squirting all plants and the moss with water every day. Two sides of the room were lighted by two double windows on each side and two electric tube lights were burning in the King Bird's room for twelve hours a day—from 8 a.m. to 8 p.m.—all the year round.

As nesting sites a vertical log and two nest-boxes were installed. All the three nesting sites had different-sized entrance holes.

Shortly after the male bird had been let into the female's room, in which she had spent over three months waiting for him to finish his moult, he started his courting. He knew her well, since their rooms had been separated only by wire mesh.

He began his courtship by raising his tail and tail wires forward until they lay at right-angles to the length of the body. He then spread out his wings so that they were slightly cupped, as shown in Plate 4. Turning towards the female, he constantly vibrated his wings, which were soon spread out to their full length.

Suddenly he changed his display completely. Instead of sitting on the branch the next instant he was hanging upside-down with his feet clinging to it. His wings were still fully expanded and vibrating. The bill was open, so that the yellow-green gape was plainly visible.

After hanging in this manner for nearly ten seconds he closed his wings and, still in a hanging position, swung his body from left to right for a few seconds. He then released his hold, dropped a short distance, and flew on to the branch.

Some days later, at 11 a.m., the male bird was singing. The song is somewhat similar to the song of the skylark, although not so loud. When the male bird sings, the discs of the tail wires are in constant motion. Whilst he was singing the female flew over and sat on a branch near to him.

He then expanded his wings and vibrated them. He moved closer to her and sat on the same branch. Then he began displaying in the usual manner, i.e. he expanded the fans and drew them up towards his head, as shown in Plates 2 and 3. At the same time he puffed out the white feathers of the underside, so as to become almost spherical, sweeping his tail wires up over his back as illustrated by the photographs just mentioned. His head was raised obliquely upwards and constantly swayed slightly from side to side.

During this display the male sat with his back turned towards the female. She moved nearer to him, so that she was at a distance of approximately 5 cm. from him. While he was displaying she occasionally picked at his feathers.

All through the winter the male was observed displaying for the female almost every day and sometimes several times a day. The most usual time for the display was in the morning hours between 8 and 10 and in the afternoons from 3 to 4. This applies to the winter months. During the summer months the birds were not excluded from the

Swedish summer daylight, which during the lightest period, in June, lasts for approximately twenty-one hours out of the twenty-four, in the Stockholm area.

In their native country Birds of Paradise are used to approximately a twelve-hour day and a twelve-hour night. During the winter months in Sweden, where, in the Stockholm area, there is only about six and a half hours' daylight at the darkest period, the birds were, as already mentioned, exposed to twelve hours of artificial light. I have never noticed that they suffered any inconvenience from the long daylight in summer. As a compensation, they took one or several naps during the day. During the summer, also, the display-times have been assigned to the same time as in the winter, but the variations in regard to the time have been greater.

The most frequent way of display of the King Bird is illustrated on Plates 2 and 3 ; in exceptional cases it continued for two minutes, but usually it was considerably shorter. When the male is really in the mood for display he repeats his performance many times and it may be observed at any time of the day, or in the evening.

When the display has continued for a while in the normal manner, with outspread fans and upbent tail wires, often the male will suddenly turn round and continue the performance in the opposite direction. Usually he alters his display after this complete turn, so that the fans are drawn in under the wings and the bird, with wide-open beak, sways his tail from side to side in the manner shown in Plate 1. A departure from this attitude is that the fans remain expanded while the tail wires are swayed from side to side. The body remains stationary during this display.

Since 10th October, when male and female were placed together, I have seen the inverted display many times during the course of the winter and spring. Members of my family have also sometimes seen this display on other occasions and, without doubt, the male often performed his inverted display when he was not under observation. The first part of the upside-down exhibit usually continues for five to ten seconds and the second phase, when he hangs with closed wings and sways from side to side, takes a similar amount of time. But on one occasion he hung with closed wings, completely motionless, for almost one minute. The various forms of display which I have observed agree in all essentials with those described by Ingram for a bird kept in captivity (*The Ibis* (9), 2 : 223–9, 1907).

During the course of the spring the female began to show increasing interest in one of the nest-boxes, the one with the largest entrance hole (diameter 8·5 cm.). In the middle of December, 1955, she had been observed for the first time to sit in the entrance hole and look in and a few days later she went inside. During the four following months she made short, sporadic visits to the nest-box. In May, 1956, however, she

flew in almost every day, and sometimes she would stay in the nest-box for half an hour to a few hours. I provided the nest-box with moss, dried fern leaves, and very thin grass so as to imitate a kind of nest. Moreover I put fern leaves and dried grass into the birdroom. The female accepted this nest but completed it with the finest grass straws she could find in the aviary.

In connection with her growing interest in the nest, the male became more ardent in his courtship. On the 24th May the male chased the female from branch to branch. She moved slowly out of his way. Now and then she stopped and for the first time I saw her sitting in mating position with her body lowered against the branch and her tail raised. Her head was pointed in an upward direction in exactly the same manner as the male's during the normal display. But when the male came near she flew away again. This happened several times. As soon as the male saw her take up this position he immediately flew to her, but she continued to avoid him. Consequently no mating took place.

After the male had been pursuing the female for some time he displayed in inverted position, but even this acrobatic performance did not lead to any mating.

On 11th June the female was in the nest-box the whole morning. When I left home at 10 a.m. to drive 30 km. into Stockholm she was still inside the nest-box. The male displayed outside the nest-box in the morning, although the female could not see the performance. At noon my wife telephoned me to say that there was an egg in the nest-box. When I returned in the afternoon the female had come out and was eating. I then went in and looked into the nest-box, which was so constructed that part of the front could be swung open by means of a hinge.

The egg was exceptionally large in comparison with the bird and proved to be a typical Bird of Paradise egg : cream-coloured, with numerous chocolate-brown streaks on the large end. The female protested strongly when I approached the nest and she continued to express her discontent all the time that I was inside her room. She flew right up to me at the nest to see what I was doing.

Since there had been no egg in the nest the previous evening and as the female had not spent the night in the nest-box, the egg must have been laid either in the early morning or forenoon of 11th June. As the female was in the nest-box all through the day of the 11th, except when eating outside, the incubation must have started as soon as the egg was laid. The following day I did not see her when she came out to eat and, as I naturally did not want to drive her out of the nest-box to see if she had laid another egg, it was not until the 13th June that I was able to ascertain that two eggs were present in the nest.

During the incubation the male bird sat almost continuously on a branch close beside the nest-box. He would occasionally stretch his

head to have a look, but he was never seen to enter the nest-box. He therefore never relieved the female during the incubation, neither did he give her food during this period.

On the other hand, he displayed diligently for her in the neighbourhood of the nest, partly in the usual manner, with expanded fans and tail-wires erected over his back, and partly, on many occasions, in the inverted position. He also repeatedly sat on a branch in front of the nest-box and vibrated with expanded wings directly outside the entrance hole, so that the female could not avoid seeing his courting.

On numerous occasions he sang his bubbling song right outside the nest-box while the female was incubating. When she came out to eat or to take a bath, he took the opportunity to look at the eggs and, later, at the nestlings, through the entrance hole.

As part of my preparations for eventual breeding I had placed a bowl of finely crushed shells in the King Bird's room. Before laying her eggs, I had often seen the female eating these shells, but during the incubation period I never saw her swallow any pieces of shell when she came out to eat. After the eggs were hatched and the young birds were in urgent need of calcium for bone-formation, she ate the shells several times a day.

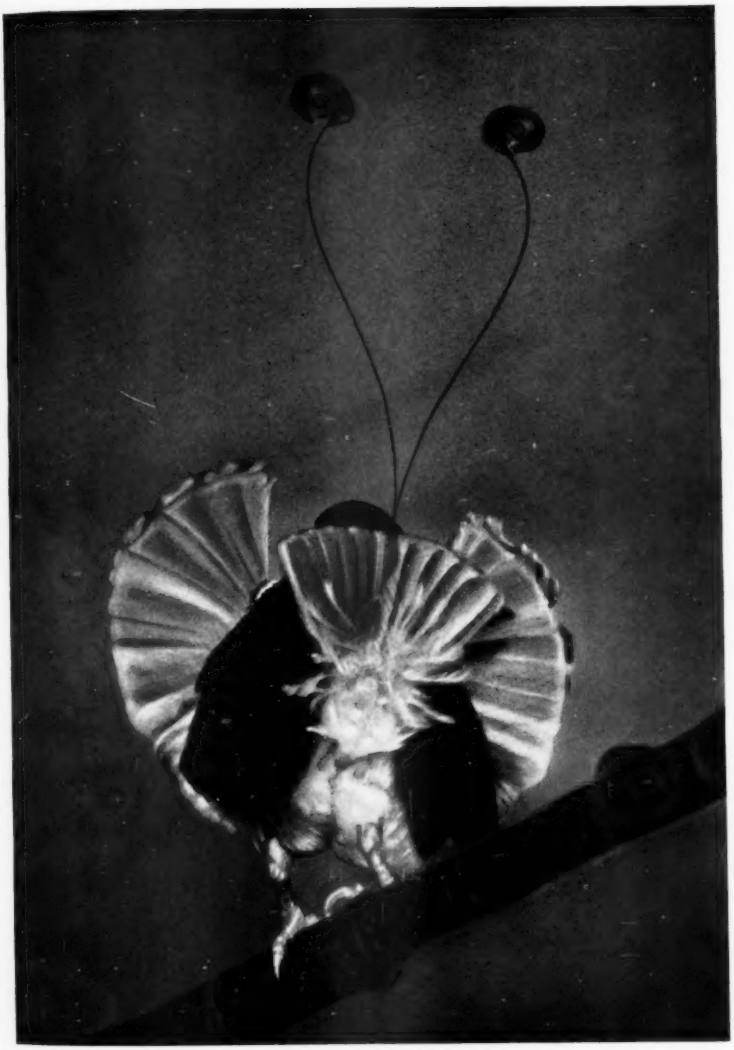
During the incubation period the female came out three or four times a day to eat. As a general rule, she also took a bath once a day and preened her feathers very carefully. The length of her visits to the feeding place varied from a few to forty-three minutes, which was the longest absence from the eggs that I observed. On that occasion the female, after she had fed, had a thorough bath and then preened her feathers for such a long time that both the male bird and I began to be nervous about the eggs. All the time the male sat beside the nest-box and repeatedly uttered his call of enticement : *a-a-a-a-a* (pronounced as in English) when she seemed in no hurry to return to the eggs.

I had not seen the birds mate, and I dared not take the eggs out of the nest to see if they were fertile. It was therefore with eager expectation that I waited to see if there would be any results at the time I had estimated.

On the morning of 28th June, after seventeen days, the eggs were still unhatched. At 3 p.m., when she came out to feed, I again inspected the nest-box and to my great joy found a newly-hatched, dark red little thing and one egg in the nest. The egg-shell was not in the nest but was found at the other end of the aviary.

I immediately went out to find fresh " ants' eggs " (more properly the pupæ of ants enclosed in their cocoons), which are the finest food one can give to an insect-eating bird. In an ant-heap about 10 km. from my house I succeeded in obtaining a good portion, which the female readily consumed.

At 7 o'clock the following morning I looked into the nest-box and



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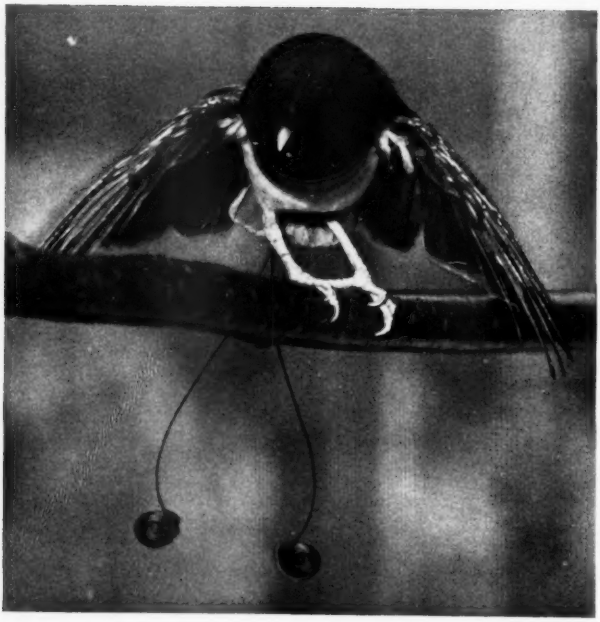
Display attitude of *Cicinnurus regius rex* (Scopoli), seen from behind.



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THE USUAL COURTSHIP ATTITUDE OF *CICINNURUS REGIUS REX* (SCOPOLI), THE MALE TAKING POSITION IN FRONT OF THE FEMALE WITH OUTSTRETCHED QUIVERING WINGS.

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Young King Birds of Paradise in the nest. One is five, the other six days old.

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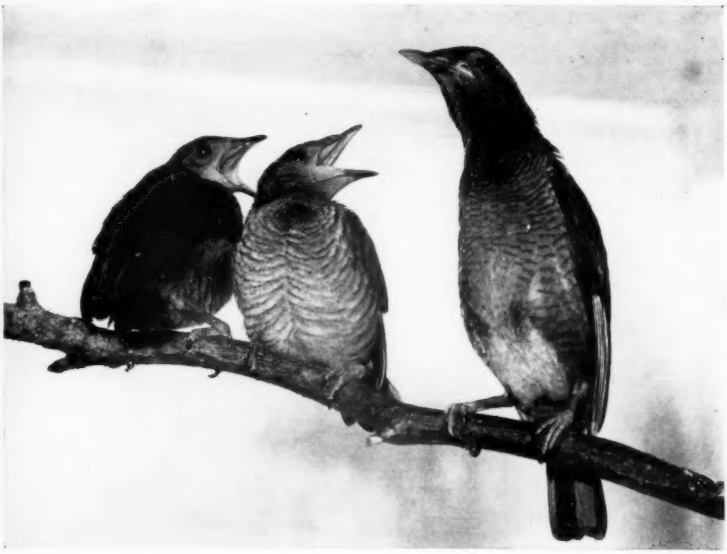
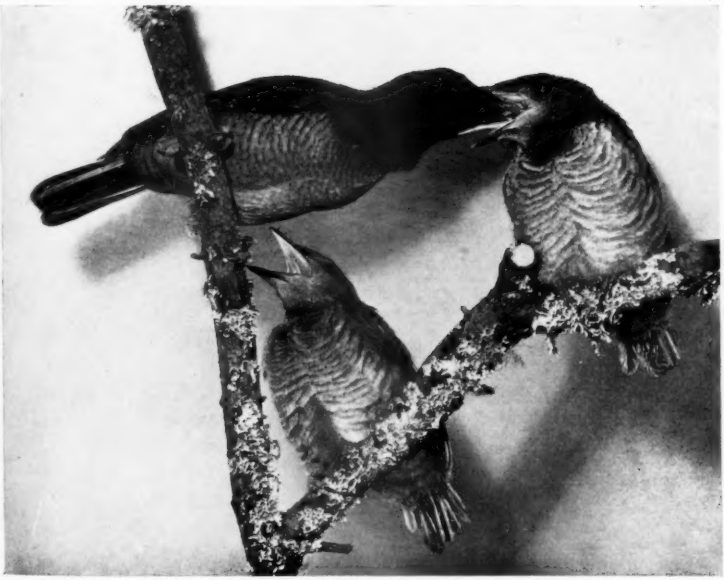
TWO PICTURES OF YOUNG *CICINNURUS*, FOURTEEN AND FIFTEEN DAYS OLD, IN THE NEST.





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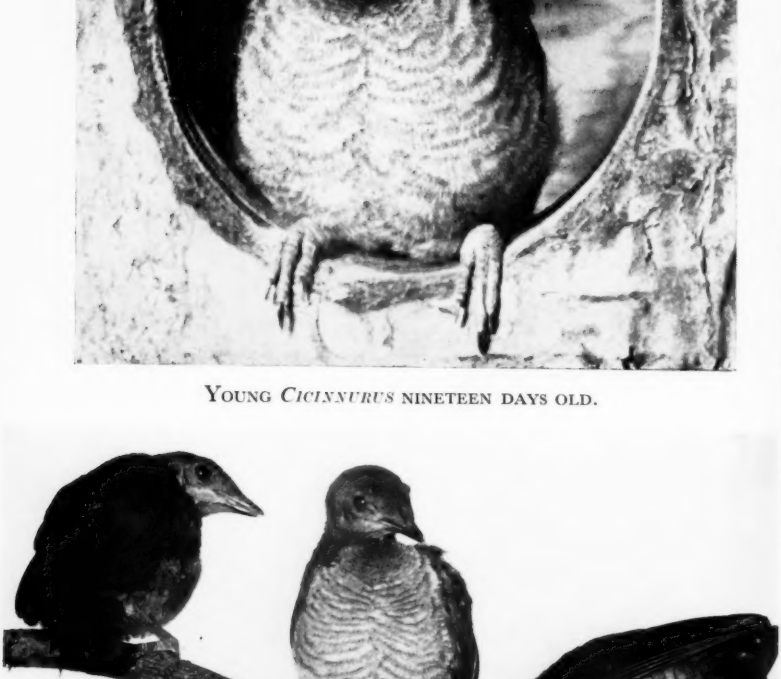
FEMALE *CICINNURUS*, APPROACHING AND FEEDING HER YOUNG, WHICH IN THESE PICTURES ARE TWENTY-ONE AND TWENTY-TWO DAYS OLD.

YOUNG *CICINNURUS* NINETEEN DAYS OLD.



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FEMALE *CICINNURUS* WITH HER YOUNG OUTSIDE THE NEST, WAITING FOR THE REMOVAL OF DROPPINGS.

found that the other egg also had hatched. It was evident, therefore, that the second egg was laid one day later than the first.

When the female returned to the nest-box, after I had visited it, I could see through the large entrance-hole that she regurgitated food from her crop to feed her young. During the whole feeding period she fed her young in this manner.

Apart from fresh ants' pupæ the family were given the following food : chopped yolk of hard-boiled egg, fresh raw meat in very small pieces, finely-chopped apple, boiled rice and finely-chopped tomato, soaked raisins, small mealworms, small live grasshoppers, and fresh whortleberries.

The fact that the eggs were hatched during the summer considerably facilitated the feeding problem. I was able to obtain fresh ants' pupæ, live grasshoppers, and fresh whortleberries. Six months before the breeding I started to give both birds daily a portion of thawed deep-frozen ant pupæ.

When supplied with food the young emitted a suppressed, feeble, peeping sound, rather like small mice. The nestlings had smooth, naked bodies and were blind. All the young birds' droppings were swallowed by the mother. When the delicate young birds would not open their beaks she touched their heads very carefully with her bill.

On the fifth day I saw the young open their eyes for the first time. Their gapes then were vivid yellow. When they were a week old I happened to open the front of the nest-box and swung it to one side. After a moment's hesitation the female fed her young just the same. Each young bird was usually given three to four regurgitated portions at one time.

Every day I released a number of small grasshoppers in the King Bird's room. The female caught them and, after she had pulled off their legs and swallowed them, regurgitated them to feed her young. When the young ones were eight and nine days old respectively, she would feed them while sitting in the entrance hole, stretching towards them and the young towards her.

It was evident that the female selected the food offered to her young. Once I watched her standing beside the young and regurgitating the contents of her crop when a whortleberry appeared. She re-swallowed this and regurgitated a mealworm instead. This she placed well forward in her beak and stuffed it into the gape of one of the young. Thereafter she regurgitated again, brought up a whortleberry, re-swallowed it, and instead regurgitated another mealworm, which she gave to the other nestling.

Since the young birds' droppings never showed any trace of blue colouring, it is obvious that the female did not feed them with whortleberries, though she ate these berries herself several times a day.

When the young birds were twelve days old nearly all their feathers

were still in their quills, which were bluish grey in colour, though one or two wing feathers had begun to sprout and these were brown. When not asleep or feeding the young birds spent nearly all their time preening their sprouting feathers.

At the age of fourteen days all feathers, both on the upper and underside, had sprouted. During this latter time the female had fed her young almost exclusively on grasshoppers. When the young were fourteen days old I saw, for the first time, the female emerging from the entrance hole with the nestlings' droppings in her beak. She then dropped them on the ground instead of swallowing them, as she had always done previously.

Between their twelfth and fourteenth day the young birds developed so quickly that one could scarcely recognize them. At the fourteenth day the whole of their upper side was brown with more red-brown on the wings. The underside was grey-brown with dark cross-bars. The legs and feet were blue, but duller in colour than those of the parents. They could now sit like proper birds, preening themselves incessantly, or stretching their legs and wings and fluttering comfortably.

When, having taken some photographs of the young in the open next-box, I had reclosed it and had been absent for a while, I found on my return that one of them was sitting in the entrance-hole. Shortly afterwards it flew out and sat on a branch close by. I picked up the young bird and held it in my hand for a while. The female flew round about and warned very loudly and incessantly. She crept with expanded wings and tail along the ground and among the branches and leaves round me. When I moved the fledgeling from one hand to the other, the mother alighted on my head and pecked my crown with her beak, beating me also with her wings. The bird was very excited, but the male merely sat calmly at a distance and looked on. He has never been observed feeding the young ones, either in the nest-box, or outside it.

The following morning both fledgelings were out and were regularly fed by the mother, as they sat on different branches. As the young were hatched on the 28th and 29th June, the eldest one had flown out on 12th July and the other on 13th July, they thus had left the nest at the fourteenth day. In the jungle they would undoubtedly have remained longer in the nest and this would have happened here also had they not been disturbed by being photographed, when the front of the nest-box had been opened.

Despite their youth, the young birds were quite sure holding on to their branches and flying to the branch for which they were aiming, although they could only fly in a straight direction, as their tail-feathers were only half a centimetre long. On the fifteenth day they could already sit on one leg and scratch their heads. Sometimes one of them would bend forward, turning round the branch and come up on the

other side without releasing its hold, an art with which all my full-grown Birds of Paradise are experts. All of them also are capable of doing both forward and backward somersaults on their branch.

The female, after having fed the young in the nest, always waited for their droppings ; but she changed her behaviour after they had left the nest and spent the day in the open. When she had finished feeding her young she had the amusing habit of bending her head inquisitively under the tail of one of them and then sitting motionless waiting for the droppings, but always in vain !

When the young were fifteen and sixteen days old, I saw them fight each other for the first time, which also happened the next day and on several later occasions. They would peck at each other with flapping wings like small cockerels. Sometimes they would swing round the branch until one of them would force the other to loose his footing and flutter down.

Every evening towards dusk the young birds began to grow restless, flying from branch to branch and from one end of the aviary to the other. It was obviously an expression of anxiety which so many birds feel in the evening, when it is time to seek a resting place for the night. At this time they uttered a cry which may be transcribed as *tjao-tjao*. A couple of weeks later they produced a flutelike complaining whistle, often uttered twice, and which later could be heard at any time of the day. When the young birds were fifty days old I heard them for the first time give their warning cry, which was reminiscent of the parents', although it was not so harsh.

At the twenty-fifth day the young birds' appearance may be described as follows : beak, dark horn-coloured, lighter at the base. Iris, grey-brown. Upper parts of the head, brown tinged with russet. The back, grey-brown. The wings, grey-brown like the tail ; the wing feathers decidedly darker brown. The greater wing-coverts and outer webs of the primaries red-brown. The underside, light grey with dark cross-bars, curved on either half of the underside. Closer dark cross-bars on the under tail-coverts. A light bar immediately above the eyes, and over this a dark spot. The chin, grey-brownish yellow with small descending streaks and points. The gape vivid yellow. The inner anterior part of the lower mandible and its borders, yellowish-green, as also the upper mandible. The legs and feet were blue, paler than the female's.

At the twenty-fifth day the young birds' tail feathers were approximately 3 cm. long. At this age they were fed every day with whortleberries, which, as mentioned before, were never given to them when still in the nest. Grasshoppers now formed a very substantial part of their diet.

At the age of one month the young birds' tail feathers were nearly as long as the female's. The young ones were much lighter on the under-

side than the female. The mother still fed them and when they begged for food they uttered feeble cheeps whilst fluttering their wings.

The male's moult began by casting one of his tail-wires on 18th June and the other on 19th June, while the female was incubating. The female started her moult on 10th August, when the young were forty-one and forty-two days old.

When the young birds were nearly two months old they changed all their feathers on the sides and top of the head, and the entire back acquired a pure grey colour. They had also grown new feathers on the under parts, where the dark cross-bars, especially on the flanks, were strongly marked. These bars were broader than in the female, which was generally browner on the under parts than the young ones. The greater wing-coverts, the primary coverts, and the outer webs of the primaries were vivid red-brown.

As I write these words the young birds are three months old. Like their parents they are both in splendid condition. They feed themselves with all the food they get, but the female gives them a titbit now and then.

The male has now almost completed his moult and is extremely elegant. It is only the tail-wires which have not yet reached their full length. The fans are not yet full grown either. Feeling that he has regained his splendour he has started to sing and display. The female has completed her moult of all the feathers on the neck and head, and has also grown new feathers on the underside.

It now remains to be seen whether my King Birds will repeat their breeding.

As far as I know this has been the first successful attempt at breeding that has ever occurred with a *Cicinnurus* held in captivity.

* * *

Grateful acknowledgment is made to E. J. Brill, Leiden, publishers of NOVA GUINEA, for the loan of the blocks of the illustrations of this article.—ED.

MALACHITE-CRESTED KINGFISHERS

(*Corythornis cristata*)

By J. M. SPENCE (Port Elizabeth Museum, South Africa)

A nest containing five young Malachite-crested Kingfishers was found near Port Elizabeth on 19th January. It was about 10 feet up in a river bank, and had a tunnel about 12 inches deep, the actual nest cavity was about six inches in diameter and extremely foul smelling. The young were estimated to be about three weeks old. They were covered with feather sheaths, some of which were already splitting to reveal the blue feathers on the back. A week later all the sheaths had vanished and the birds were fully fledged. Their droppings were very liquid and quickly absorbed in sand. When first taken from the nest the young would defecate in all directions, and if the droppings happened to fall on the feather sheaths they would just run off, thereby keeping them quite clean. As they grew older the chicks would back away from the others and deposit the droppings well away from them.

Three of the young were taken and hand-reared; they thrived on strips of fish as well as ten to fifteen small whole fish per bird per day. When fed whole fish they would throw up a cast of the scales and bones.

For the two days after they were feathered the young birds made no attempt to fly, then on the morning of the 28th they jumped one by one to the edge of their box and flew strongly around the room. Needless to say, they were immediately caged. The next day they started to take an interest in any food that accidentally fell to the floor while they were being fed, but made no attempt to pick it up. The following morning a dish containing some small live fish in shallow water was placed in their cage. Although obviously interested, they made no attempt to catch any until the 31st. Next day they were taking live and strips of fish. I found that raw fish is rather inclined to come to pieces in water, so strips of donkey heart were tried; this proved very successful, and they took to it without any trouble. They were not hand-fed after they were five weeks old.

They are great bathers, and if not given a dish of clean water each day they use the feeding dish to wash in. Their quaint habit of bobbing their heads up and down was obvious from the day they could fly, but they very seldom raise their crests.

They have two methods of "catching" their food, one by diving either from a perch or hovering above the food or else, by alighting on the edge of the dish and pecking the strips of food out. These are usually thoroughly "killed" before eating by being beaten on a perch. If the food is small fish they are always swallowed head first.

Although they are not as brightly coloured as the adult, they are nevertheless very beautiful, having the area between the eye and lores a light buff. The cheeks and breast are dark grey-brown, with the throat and crown as in the adult. The abdomen is a lighter colour orange than the flanks and shoulders. The rump and upper tail-coverts are bright metallic blue, while the mantle and back are bright metallic greenish-blue. The primaries are black, and the secondaries and coverts dark blue with bright turquoise spots. The feet and legs are orange underneath and grey above, while the beak is black with a white tip.

As you can imagine, they are very interesting and beautiful little birds, and make a wonderful addition to our fast-growing collection of live birds.

* * *

FIRST BREEDING IN CAPTIVITY OF THE SEVERE MACAW

(*Ara severa* (Linnaeus))

By Otto Hirthe (Copenhagen)

(*Translated from the Danish by C. af Enehjelm*)

In 1953 I bought a nice pair of Severe Macaws from the animal dealer C. H. Krag, of this town. The birds were almost identical, only the red colour on the forehead of the bird believed to be the cock was somewhat more pronounced. The birds seemed very attached to each other, so I thought they must be a true pair. I put them in a compartment of my largest aviary. This consists of a long brick building, 60 feet long, 8 feet wide, and 8 feet high. The house is divided into eighteen compartments, each approximately 3 feet by 5 feet, with a 3 feet passageway running along the back of the house. Each compartment has an outside flight, approximately $3\frac{1}{2}$ feet wide, 20 feet long, and 7 feet high. One box was hung in the shelter and another in the outside flight. The boxes were made of $1\frac{1}{2}$ inch boards, approximately 1 foot by 1 foot and $2\frac{1}{2}$ feet high. On the bottom of the boxes I placed a layer of moist earth, and on the top of this a layer of peat-moss, about 6 inches deep in all. Neither of the boxes was used for sleeping. In spite of the very cold winter, 1953–54, the birds spent all day in the flight, even the cold nights did not seem to hurt them in any way.

The food consisted of sunflower seed, various millets, peanuts, and groats. They also got all kinds of sweet fruit, apples, oranges, grapes, etc. Strangely enough the birds did not seem to appreciate bananas. Raw carrot was given freely, and should, in my experience, always be fed to nesting parrots and parrakeets. Also sprouted oats and

sprouted spray millet were given daily. The birds did not take ordinary green food, as usually given, with the exception of the yellow dandelion blossoms, which they took readily, but not the ripe heads. The Macaws seemed to thrive excellently on this food, and at the end of May, 1954, I thought that the birds would start nesting, as they seemed to be interested in the nest-box. Things, however, went differently. I give fresh branches in the flight, and every time I bring new branches, the Macaws first bite off all the leaves, then the twigs, and finally, gnaw off the bark. Macaws should always have fresh branches for gnawing. This does them a lot of good and keeps them occupied.

At the beginning of August the birds started to feed each other, and I also saw a single attempt at mating. It really was a true pair. On the 6th August the hen disappeared into the box in the outside flight and the cock spent most of his time in the neighbourhood of the box. He also visited the hen several times a day and slept in the box every night during the period of incubation. A nest inspection was very difficult, as I was usually attacked by the birds. On the 19th of August I took a thin lath and gently pushed away the birds from the centre of the nest, and an egg was visible on the bottom of the box. When checking again on the 24th of August, I saw three eggs, and these comprised the whole clutch. Apparently the eggs were laid every other day. I did not inspect the nest again until the 12th of September, when I saw a young bird, which seemed to be newly hatched. Three days later, when checking the nest, I found another young one lying dead, apparently crushed under the mother. The third egg was infertile, and was removed. The remaining young one throve excellently. Besides the ordinary food, I gave eggfood (hard-boiled egg with biscuit), and boiled rice with milk and sweetened with sugar and different sweet jams—this food, by the way, also being given at intervals all the year round. The youngster left the nest on the 28th October, beautifully feathered, and was greeted by the parents with loud cries. A little later the young bird flew with the parents through the long flight, the parents taking good care of it. The bird appears to be a cock, the red patch on the forehead being as big as that of the old cock. It is delightfully tame, and takes food from my hand.

The incubation period of the Severe Macaw is obviously 25–28 days, and the young birds leave the nest when about 7 weeks old. They are fed by their parents for quite a long time, but are independent about six weeks after leaving the nest.

In 1955 another young bird was bred, and in 1956 three. These were exhibited at the large bird show at Copenhagen in November, and were awarded the 'Sluis' cup for meritorious breeding.

* * *

NOTES ON THE DARK FIRE FINCH

(*Lagonosticta rubricata*)

By C. J. O. Harrison (Tooting, London, England)

These notes are an addition to the previous article (Avicultural Magazine, vol. 62, 1956, p. 128), and complete the study on those Fire Finches commonly available to aviculturists in this country.

Appearance

The Dark Fire Finch (*Lagonosticta rubricata*) is also known as the Blue-billed Fire Finch, though this name is usually applied to the West African subspecies, which is the one most frequently imported, and the one on which these observations were made.

The cock is dark, perhaps dull, scarlet on the head, breast, and belly, and the mantle is a dark slate-grey. In this subspecies the dark grey extends on to the nape and crown, but in others the head may be entirely red. The wings are a similar colour to the mantle, but perhaps a little browner. The rump is scarlet, as is the base of the black tail, while the under tail-coverts are black. There is a faint white rim to the eye, and the bill is steel-blue. The hen is pinker than the cock on head and breast with a small area of buff on the belly. The general shape is that of a small squat bird with a narrow head and prominent bill.

This species is unfortunately being widely sold and exhibited as another species—Jameson's Fire Finch (*L. jamesoni*). At one time the two were considered to be related subspecies, but they are now separated. Jameson's Fire Finch is pinker on the head, light red on the breast, and brown on the back : but the principal distinguishing feature is the shape of the second primary feather. The first primary in both species is vestigial, and what appears to be the first is in reality the second. In Jameson's Fire Finch this latter feather tapers a little towards the tip, but in the case of the Dark Fire Finch it is cut away on the inner web towards the tip, so that the feather narrows suddenly and the terminal portion is very slender. This feature is constant in the different sexes and plumages.

General Behaviour

It is a rather nervous and furtive bird, resembling the Bar-breasted Fire Finch (*L. rufopicta*) in its habits. Like that species it has a crouching posture. If alarmed it tends to hide, and if free in a room will disappear into the darkest corner or under furniture, and remain still and silent. I found that it quickly learnt to find its way around a room. Even before a nest had been made it showed preference for roosting in

a box. In spite of its furtive manner I found it an aggressive species. When two cocks were put together one would chase the other continually, one of the birds (I am not sure which) uttering a low, soft "tuc" note. When I put one with Senegal Fire Finches (*L. senegala*) and Lavender Finches (*L. caerulescens*) it dominated both.

Call-note

The call-note is low-pitched, nasal, and slightly harsh—"kyew" or "kyah". It has a wide range of expression, from a soft, subdued note used between a pair when feeding or on the move, to a loud, harsh version used in periods of excitement or isolation.

Alarm-note

This differs in form from that used by the Senegal and Bar-breasted Fire Finches. It is abrupt, similar to theirs, but higher in pitch, and is repeated in a rapid series that run together to form a single rattling trill. The pitch is variable, becoming higher as anxiety increases. It is accompanied by a crouching posture similar to that of the Bar-breasted but with the head raised on a rather thin neck. The tail is held to one side, half-spread and jerked sideways at each call.

Song

The dangers of generalizations based on a study of too few specimens were brought home to me with this species, for the first cock that I possessed had a song which consisted merely of a long-drawn toneless trill on a single flat note. It was only with subsequent birds that I heard the more normal song. The cock of a nesting pair did not sing when the hen was on the nest, but used instead, low-intensity alarm-notes together with a more melodious form of the call-note.

When the hen died the cock began to sing immediately and persistently. The song was melodious though generally high-pitched, surprisingly loud, and consisted of short phrases frequently repeated. During one period I timed it and found that it consisted of phrases $1\frac{1}{2}$–$2\frac{1}{2}$ seconds long, uttered at intervals of 5–6 seconds. In volume and pitch it reminded me of a Robin's song, but the style was mock-Nightingale. A typical phrase would consist of the rapid repetition of a note, seven or eight times; but there were frequent changes of pitch between phrases, suggestions of crescendo and diminuendo, and sometimes a short descending cadence. Once or twice I did hear a short trill reminiscent of the first cock's song.

Nest-call

This was heard frequently during, and just after, nest-building. It was a faint persistent clucking note repeated with great rapidity.

I was not able to compare it directly, but would have said that it was lower in pitch than the Senegal Fire Finch's call, which is in turn lower than the Bar-breasted's.

Display

This is similar to the display of the Bar-breasted Fire Finch. The cock holds a piece of grass or a feather by its tip. It stretches very straight upright with head thrown back and head and neck feathers sleeked down, while the belly feathers are a little fluffed and the tail half-spread. The movement consists, as in the other Fire Finches, of a series of vigorous upward jerks, usually in repeated sets of four bobs. At each jerk there is an upward movement of the bill and in many, possibly all, cases the head is turned alternately half to one side and then the other, so that the grass or feather appears to be waved jerkily from side to side while the bird is bobbing up and down. There does not appear to be any special movement at the completion of the display. I did not notice any specialized flight of the cock while carrying display material.

Unmated cocks showed what I took to be an undirected display homologous with the " stip " display in the Senegal Fire Finch. In it the bird had a rather tense posture, upright, with head raised. It continually repeated a single note which I called a " squelch " note since it reminded me most of the sound when air is squeezed out of a wet rubber sponge with a rush of tiny bubbles, and was also reminiscent of the " fwit " of a thin twig swished through the air. Each note was accompanied by an upward movement of the bill, and terminated in a subdued click.

I was surprised that it did not appear at the end of the display of the paired cock. When the hen died the cock began to intersperse its song with periodic repetitions of the note. Finally, about two weeks after the hen's death, it picked up a grass-stem and indulged in a momentary display during which I was able to detect that the note occurred, with the lifting of the grass-stem to one side or the other, at each upward jerk of the bird ; but it was normally masked in my cages by the heavy thud of the bird's feet on the perch as it bounced up and down.

Other postures

When the pair were first put together there was a certain amount of what appeared to be aggressive behaviour. I thought for a few days that I might have two cocks. Both birds would take up similar postures side by side, with neck stretched straight upwards, head thrown back and bill raised, while the tail was cocked and half-spread. In this position they would pivot from side to side, the bill-tips occasionally touching as though one bird was parrying the thrust

of the other. This occurred not only in the pair-formation period, but also in the early stages of nest-building.

Nesting

Within a few days of being placed together a pair built a nest in a cardboard box that had been put up for that purpose. The nest was of coarse grass and leaves, and lined with feathers and fibre. As in the other Fire Finches the cock brought all the material and built the outer, rough shape of the nest, while the hen lined the nest with material brought by the cock. In this case the hen began to assist before the outer shape was complete.

Postscript

These notes complete my observations on Fire Finches to date. It will be seen that they are, with the exception of the Lavender Finch, very similar species, with distinct differences of song and slighter variations of display and calls that serve to illustrate both their relationship and the differences which enable them to preserve their specific identity.

If it should be asked why they appear in these pages I would plead that it is only through a knowledge of a bird's life and behaviour that we can understand how best to keep it, and that it is only through aviculture that it has been possible for the observations to be made. Detailed studies on these species in their natural habitat are still lacking, and I hope that these notes will be of some value to future students.

* * *

BREEDING ZOSTEROPS

By A. A. Clarence (Parkstone, Dorset, England)

Of my birds, I think a pair of Indian Zosterops has given me as great pleasure as any. This, I say, even though I have an Indian Shama who on many a warm night has charmed the silence with notes that would intrigue a Nightingale.

The Zosterops arrived in the late spring and were liberated into an aviary considered suitable to their needs. Luckily the weather held fine for a considerable time and they did not appear to find the English climate anything unusual. In Northern India, the sun deals sunstroke by day, and it can be cold to freezing at night.

The aviary, 15 feet long by 4 feet wide and 8 feet high, was built against a very old brick wall. This was riddled with crevices and holes made by the hand-cut nails of former generations. They formed ideal

hide-outs for spiders and other insects. The wall faced south, and the aviary was also protected from east and west winds. An apple tree sapling, self-sown, grew tight to the bricks. It's branches radiated, and pressing hard against the wire roof, formed a canopy of leaves which effectively kept out rain.

For those who have not seen a Zosterops, let me say that they are small, short-tailed, insectivorous birds, about the size of an English Wren. Their colour is a warm grey-green with a grey-white stomach, which merges into yellowish-green on the breast and lemon-yellow under the beak. The eyes are their most arresting feature. These are bordered with white rims, which have earned them the name of Spectacled Zosterops. Knowing nothing of the nesting habits of these active little birds, I gave them soft, dry meadow-grass and hay. In due course they became interested, and wove the hay into a rough bundle between the fork at the end of a horizontal branch about six feet above ground.

Adjoining this aviary was another, but of larger proportions, being 40 feet long, 8 feet wide, and 12 feet high. It contained some Chinquis Pheasants, a pair of Senegal Touracous, a few parrakeets, and also a pair of Zebra Finches. At the partition top, a strip of wire allowed the inmates to look into the Zosterops' aviary. The Zebra Finches appeared to be fascinated by the "goings on" of the Zosterops, and were desperately anxious to get a closer view of the nest. At last they discovered that a heaven-sent mouse had enlarged a hole, where the wire adjoined the wall, and through this they squeezed.

I don't know what goes on in the minds of birds, but these Zebras had fully made up theirs long before they passed the wire netting. In no time they had that bundle of hay torn to shreds, and were preening themselves on a good day's work. You could almost hear them say "Good-bye to all that"! Later, finding seed only in a trap cage, they were soon caught and transferred elsewhere.

It so happened that two little French poodles were being clipped for show at that time. I threw a couple of handfuls of their brown curly hair into the aviary. With evident delight, the Zosterops seized upon it, and set to work to create a masterpiece of construction. Choosing as before the flat fork at the end of a branch about 3 feet above ground, they tightly wove a small, deep cup as neat as their first effort had been ragged. It was interesting to note that this time the nest was not visible from the next-door aviary. It hung under the fork and was bound to it by two hinges, each about an inch long. Some small feathers were used for lining, and two diminutive, blue-green eggs were laid. These could be seen with the aid of a cane through the wire, to which was attached a small looking-glass.

The little hen sat deep in her cradle, showing only the tip of her beak and tail, while one beady eye, made very visible by its white

spectacled rim, missed nothing that passed. She had the delightful habit of pulling a solitary large white feather over her back when the weather was cold. I do not know exactly how long the incubation took, as she sat close and gave little or no chance of looking into her nest. However, in a seemingly very short time, about a fortnight, she was off hunting for insects.

Two children gathered ant-eggs from under the stones which bordered the paths of the garden, and swept the hay-fields with butterfly nets, catching quantities of flies, etc., from the grass tops. At first the two babies looked like black spiders at the bottom of the nest. They grew fast, and no parents could have been more zealous in caring for their wants. Eventually they left the nest as two grey-green balls of fluff, and were coaxed by their parents to the top of the apple tree and on to the sleeping perch. With the two chicks between them, they made a charming picture. Later on they placed one baby between them—the other had to take an outside seat. Somehow I think that the favoured infant was the hen. It appeared to be smaller.

When the youngsters had grown to full size, and were able to fend for themselves, the parents decided to build a new nest, and pulled the old one to pieces. The cock, however, apparently also decided that he could not tolerate another of his own sex in the aviary, and unseen by anybody, he slew his son, reducing his pretty young head to a raw skull. His daughter continued to live and sleep between the parents as before.

Unhappily the weather changed, and they apparently decided that the conditions were unfavourable for building, this much to my regret, having just bought a colour film.

* * *

BRITISH AVICULTURISTS' CLUB

Meetings and dinners during the 1957–58 session have been arranged for the following dates :—

9th September, 1957
11th November, 1957
13th January, 1958
10th March, 1958
12th May, 1958

Will members please note that in future the Meetings will be held on the second Monday in the month, *not* Wednesday as hitherto.

ARTHUR A. PRESTWICH,
Hon. Secretary.

BREEDING THE STAR FINCH OR RUFICAUDA

(*Bathilda ruficauda*)

By Nicholas Gravem (Mill Valley, California, U.S.A.)

Of the so-called Australian grass-finches, I personally believe the Star Finch or Ruficauda (*Bathilda ruficauda*) has been rather neglected as an aviary subject and particularly as regards its breeding. Here in California, imported Stars are plentiful enough ; however, aviary-bred birds are sadly scarce. I understand that this same state of affairs also exists, more or less, in Britain. Perhaps a few remarks on breeding these finches, over here, may be of interest.

I breed Stars and Gouldians indoors in cages measuring about 24 by 18 by 15 inches deep. These cages are built in batteries of four in a unit and are truly box-cages with only the fronts open. I have never known Stars use a nest-box like Gouldians ; and they are furnished with one of those tiny, wooden-barred canary travelling-cages, with the bottom knocked out, and fitted within the cage on its side.

It has been my experience that these birds generally, as Gouldians, come into condition and breed during our winter months, going into post-nuptial moult in our late spring or early summer. However, I have found that Stars are very much more flexible than Gouldians with regard to adapting their breeding cycle to the spring and summer of our northern hemisphere.

After mating (by " mating ", I mean pairing, not coition), the cock proceeds with most of the work of nest-building, the hen assisting to a minor degree. Compared with a Gouldian nest, this is a very neat piece of work. The nest, built within the canary travelling-cage, is a globular affair with entrance in the side and is usually started with the coarsest material at hand and then receiving an inside lining of fine, dry grass and (supplied) feathers. " Egg sandwich " architecture—so frequently employed by over-zealous Zebras and less frequently by frustrated Gouldian cocks—is seldom resorted to.

Three to five white eggs seem to be the rule, incubated for some twelve or thirteen days. Very little egg-binding seems to occur with Stars, even when breeding is controlled in small cages affording so little exercise. (Gouldian hens, of course, are rather prone to this complaint ; and I find that if a hen of this species becomes egg-bound and, more particularly, if she reabsorbs the egg instead of expelling it, egg-binding will always recur and the only thing to do is to retire that particular hen from the breeding-cage.)

Diurnal incubation is usually shared by cock and hen, with the hen alone incubating at night ; though in occasional pairs both will occupy the nest at night. The incubation patch in the median apterium of the hen is not as easily seen as it is on the abdomen of, say, a hen Gouldian.

I believe cocks of the genera *Bathilda* and *Poëphila* are without this patch—even though they do a large amount of daytime incubating—and perhaps this is why these cocks incubate only during the day and the hens at night when greater heat is required to keep the eggs warm. Both parents also share in brooding duties.

Upon hatching, the young are fed by both parents by regurgitation, with the cock perhaps doing more of the feeding as the nestlings grow, both cock and hen usually being model parents. I believe insect fare is necessary, or desertion will result. I use cut-up mealworms : one worm three times a day upon hatching and increasing the number of worms by one each day until they have fledged. This is along the lines suggested by Mr. Brooksbank in his excellent book *Foreign Birds for Garden Aviaries*. Mealworms are used as a matter of convenience and undoubtedly any number of other insect forms would also fill the bill. I have not found mealworms overheating to the parent birds or otherwise objectionable, at least not while following the rationing schedule as above. Millet sprays are before the birds at all times ; soaked sprays when feeding young. I have had no real success with egg-food, bread and milk, sponge cake, etc., in regard to nestling grass-finches.

The basic seed diet consists of about three-quarters small canary mixed with one-quarter white millet, shaken with a little C.L.O. Most so-called finch seed mixtures are predominantly millet ; mine mostly canary. Also available at all times is a supplement mixture of more or less wild seeds that consists of : water-grass, sweet sudan (red and yellow), brassica, kohlrabi, lettuce (black and white), clover, rye-grass, and phalaris. This latter gives the birds, I believe, more than enough variety. Cuttlebone in its original form is not given. Instead, a mixture of ground cuttlebone, ground oyster shell, and ground boiled egg-shells, in equal parts, with a bit of flaked charcoal added, is supplied. The only green food offered is the small, young shoots from planted rape seed. I am successful with this diet ; and I am sure other aviculturists have equally sound diets, as well as successful systems of breeding and management for grass-finches. I don't believe in dogmatic ideas in reference to things avian.

I leave young Stars with the parents as long as possible after leaving the nest, but still manage to get two nests per pair (infrequently three) per year. The young, upon leaving the nest, roughly resemble young Gouldians, but with darker bills, and completely lack the papillæ-like spots of colour in the malar region, as possessed by the Gouldians ; but, before leaving the nest, the young Stars have well-developed white areas at the commisural point (angle of the mouth), as well as coloured mouth linings. Incidentally, young Stars have quite dark toe-nails compared with the lighter colour of tarsus and toes. Sexing of young prior to the postjuvenal moult is considerably more difficult than with Gouldians (in which case the young hens exhibit darker bills than the

cocks) ; however, the fledged male Stars very soon attempt their small warble of a song.

Young Stars bathe almost immediately upon quitting the nest; unlike Gouldians, which I find a bit reluctant to bathe. (However, young Gouldians placed with young Stars soon imitate the latter and bathe several times a day ; but when separated from the Stars, these ablutions soon taper off. This would indicate that their innate bathing behaviour can be readily accelerated by visual stimulation.)

One drawback with aviary-raised Stars is that they almost always tend toward xanthochroism ; that is, the red feathering is replaced with yellow or yellowish, quite unlike freshly imported specimens. Most aviculturists claim, I believe, that this is due to a dietary deficiency and particularly as regards live insect food. However, as red in feathers results usually from chemical substances (carotenoids) taken with green stuff, I wonder if live food has any bearing on the matter. I have heard that soya bean, in some form, has been successful with Tanagers in this regard.

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THE STORY OF A LAPWING

By A. A. Clarence (Parkstone, Dorset, England)

Some years ago I was at a partridge "shoot". It was of the "set-piece" kind : every stand marked, with its number embossed in black on a large white metal plate, which was fixed to a rod and stood about 2 feet above ground. At the first stand of the day my position was near the corner of a high-hedged field. There I was surprised to see a Plover standing motionless. I soon realized that it could not fly and without difficulty caught it. I was astonished when I saw that it had only one wing—the other was missing at the shoulder. It had been cut off "clean as a whistle". The skin had drawn together over the bone and there was no blood. A surgeon could not have done a neater job.

I put the Lapwing in a gamebag and passed it to a farm-hand, who was acting as my carrier. This youth collected some worms and gave them to the bird, which was very hungry. At the last stand of the day I found myself in a field which adjoined the one in which I had begun the day. At the base of the number plate lay a severed wing.

No doubt the Plover had struck the plate in one of the fast swooping dives which these birds delight in during the twilight hours when, as though at a given signal, the whole world of night life awakens, and Plover, Snipe, duck, and Curlew break into a cacophony of sound, a chorus of calls, and whirring wings. On the

other hand, the Plover may have mistaken the white plate for one of his own kind, and on a tour of inspection met his Waterloo.

We put him in a rabbit hutch, well supplied with water and earthworms. Next day he was liberated into a 15-ft. square roofless pen, to which another pen of the same size adjoined. These pens were built on solid sand and were used for rearing baby pheasants. An aperture 10 inches long and $3\frac{1}{2}$ inches high was at ground level in order to allow the chicks to pass into the second pen, where grass tufts and a dead mouse or two acted as cover and bait for flies.

I knew that Lapwings were quick-eyed birds, but I did not expect this one to find the "bob hole" instantly, the exit being so well below its line of vision. Having examined the second pen it returned to the first, and never faltered or had to look for the opening. Brailed Partridges would wander up and down the wire division all day and never find it.

"Mr. Pee-Weet," as he was called, soon grew tame, and flourished on the worms and insects brought to him by children, who were enthusiastic hunters on his behalf and derived great entertainment from the bobbing and bowing, which he did from the top of a box covered with turf.

The winter set in and he looked very handsome and glossy standing on this box. It was meant for him to shelter in, but he never used it.

In January there was a severe night frost; this proved more than his exposed side could stand. He was found frozen dead on top of the box, much to my sorrow and that of his young friends, who buried him in a boot box, with a wooden cross, flowers, and all!

* * *

SUCCESSES AND FAILURES OF A SCOTTISH AVICULTURIST

By Tom Spence (Newburgh, Fife, Scotland)

Ill-luck or bad management, I don't know which, but certainly I have not done well with breeding of birds so far this season. For example, out of about forty Ruddy Shelducks eggs I have only eight ducklings. The fertility was poor, but there was a dreadfully poor hatch with deads-in-the-shell; and of those that hatched a fair number were murdered by the unnatural wretches of broody hens that I had bought in. I have, however, a nice strong young brood of New Zealand Shelducks, which by their very strength must invite misfortune on them!

The only lories which have laid have either eaten their eggs or refused to sit on them, and truth to tell I am beginning to lose interest

in them. I still have about a dozen pairs and a good few single birds, mostly hand-tame.

Last year I did very badly and reared very few birds. The only relatively bright spot was the " Foxwarren " Green Peafowl. The Peahen laid no less than 18 eggs before going broody, really three clutches. Of these one was clear and one was infertile because of an imperfect shell. The rest were all embryonated, but unfortunately nearly all of those I trusted to an electric incubator died in the shell. Of those left with the Peahen or with broodies, nine hatched. Had I written sooner, as I had intended, I might have been able to say that I had reared them all without loss, for until they were about seven or eight months old, I had no losses. Since then, however, one was killed (by a broody), one died of " cold weather Pasteurellosis ", and two developed such crippled toes that I destroyed them. The survivors, one male and four females, are all good birds.

This year the Peahen has already laid two clutches totalling 14 eggs. The first four hatched, four out of four, yesterday. They look strong, one male and three females, I should say. All the eggs so far candled have been fertile.

My little Demoiselle, a tame one, laid within about ten feet of the dining-room and seemed likely to sit well. The egg, however, was stolen, presumably by the Jackdaws that infest my place, and the shell found under a nearby tree. I was very sad at this and made even more so by the way that her ladyship followed me around as though I had stolen it. Luckily she has laid again and this time I quickly substituted a Barnacle Goose's egg, boiled in coffee and ink and splodged to simulate the Crane's egg. She took to this without demur and is incubating within ten feet of the door ! If the egg is fertile I may return it to her when nearly ready to hatch, or I may be tempted to try to rear it myself. I *think* the Stanley Cranes are a pair ; so do they most times and they are defending a nest area quite fiercely. My attitude is one of interest quite purged of hope or expectation. The European Cranes are still too young to breed, though they are taming nicely. I have a veritable drove (six) of Vulturine Guineafowl, but they are all juveniles except for one, and I can't expect anything this season, though they look in better form than any of my birds and are so tame that they follow me closely round their acre paddock.

I have quite a few ducklings of different species of Shelduck and geese, and of these I am particularly watchful over the New Zealand Shelducklings. There are also a few (precious few) baby pheasants.

Of the softbills, the Spreos finally revealed their sexes by laying three infertile clutches at the same time. I know now that I had three females. Luckily I had already a " cock " which I now introduced. He was a real " Peer Gynt " and a-man-for-all-three-of-them.

Two of them (females) laid again and there are now (about) seven young in one nest which all four are feeding. Strangely the third female has not laid again, probably inhibited from doing so by the stimulus of the young. These four get on without a sign of discord, but when I introduced a second male, a beautiful bird the " size of a Jackdaw," there was a most dreadful melée, and later I took out the " bits " which I was able to blow life into and which has recovered. Of course this second " male " even though big, is almost certainly a female, for I have put it beside yet another male which has espoused " her " right away.

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LONDON ZOO NOTES

By J. J. Yealland

The Toucan-Barbets, presumably so called because of the large yellow and black, though not very Toucan-like bill, inhabit sub-tropical zones in the Andes of north-western South America where there are two forms :—

Semnornis ramphastinus of Ecuador and *S. r. caucae* of Colombia. A third member of this genus is the Costa Rican Barbet (*Semnornis frantzii*) of sub-tropical zones in Costa Rica and western Panama. A specimen of the first of these, new to the Collection, has been received in exchange ; it makes a particularly interesting and attractive exhibit at the Bird House.

Another bird not previously exhibited here is the Dusky Miner (*Myzantha obscura*), one of the many Australian Honey-eaters. The name used to be spelt Minah, and, of course, a better one would be Dusky Honey-eater, but there is another, *Myzomela obscura*, already known by this name.

Two White-bellied Storm Petrels (*Fregetta grallaria*) flew on board R.M.S. *Dunnottar Castle* off Ascension. The ship's cat soon killed one and the second was rescued by the wireless operator and brought to London ; it lived only a few days.

Six King Penguins were brought from the Antarctic by H.M.S. *Protector* and presented by the Captain and Ship's Company. A Cape Robin-Chat (*Cossypha caffra*) has been presented by Capt. R. S. de Q. Quincey and two Malayan Coast White-eyes (*Zosterops palpebrosa aureiventer*) by Mr. J. Newmark. An interesting addition to the Parrot House is a Cuban Conure (*Aratinga euops*), also known as the Red-speckled or Euops Conure.

Mr. M. Horwood collected two nestling White-necked Picathartes in Ghana, feeding them mainly, I believe, on earthworms, and a friend of his brought them to London by air. They are strong birds with enormous appetites and they are so far thriving on the insectile mixture used at the Bird House and some mealworms.

Two Maned Geese, another Cormorant, various Gulls and Pheasants, including four Swinhoe's, have been bred in the Gardens. The Green-winged King Parrakeets are nesting and another Swainson's × Red-collared Lorikeet has been bred. The Satin Bower-birds built a flimsy nest of twigs, bamboo and privet leaves. One egg was laid, but it was broken soon afterwards. Four Greenfinches have been bred in the British Birds' Aviary where a Stone Curlew is incubating three eggs. Four Zebra Finches have been bred and there are nests of Blue Tanagers, Black-throated Cardinals, Malayan Glossy Starlings, and Black Crakes.

The Snowy Owls nested as usual and eight eggs were laid. Three of these were given to a Spotted Eagle-Owl whose own eggs were infertile and she hatched all three, of which two are surviving and are now quite large. The Snowy Owl itself hatched several chicks, letting them all die but one which is flourishing and growing fast. An Australian Stone Curlew that was in Mr. Spedan Lewis's collection at Leckford before the war now lives in the centre aviary at the Bird House and continues to lay one or two eggs each year.

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NEWS AND VIEWS

Miss Phyllis Barclay-Smith represented the Society at the first Pan-African Ornithological Congress held at Livingstone, Northern Rhodesia, on 15th–20th July, 1957.

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The Bronze Medal of the Avicultural Society of South Australia has been awarded to A. Phillips, for breeding the Red-chested Quail.

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D. Lievens, Moerzeke, by Dendermonde, Belgium, has a quite exceptional pair of Mealy Rosellas. In three breeding seasons they produced 32 eggs, of which 30 were fertile and 30 young were reared: 1954, 6 and 4; 1955, 5 and 4; 1956, 6 and 5.

* * *

The Edinburgh Zoo continues to be successful in breeding Penguins. For 1956, the report is that the King laid 13 eggs from which 8 chicks were reared; Gentoo, 10 eggs, 9 hatched, 3 chicks reared; Maccaroni 4 eggs and Ringed 2, none hatched.

The Keston Foreign Bird Farm has recently received a few pairs of rarely imported birds. They are the Crimson-rumped or Sundevall's Waxbill (*Estrilda rhodopyga*) ; Alexander's Cut-throat (*Amadina fasciata alexanderi*) ; and Abyssinian Red-cheeked Cordon-bleu (*Uraeginthus bengalus schoanus*)—all native to Abyssinia.

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Last year a pair of Princess of Wales' Parrakeets owned by C. Newton Capron, Lake Worth, Florida, was triple brooded ; nests of 3, 2, and 4 were reared. So far this season they have 2 young flying, with 4 in a second nest. It will be interesting to see whether they again rear 3 broods.

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Sixty-five members and guests accepted the invitation of the Council of the North of England Zoological Society to visit the Zoological Gardens, Chester, on 25th June, 1957. Mr. G. B. Groundsell, President of the Society, presided at the lunch and welcomed the visitors, and our Vice-President Jean Delacour replied in his own inimitable manner. The Director-Secretary, G. S. Mottershead, and his staff, were untiring in their efforts to make the visitors welcome, and the warmest thanks of all are accorded to them for a very enjoyable and memorable visit.

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Breeding reports : E. J. Boosey, the "*Keston*" Senegal Parrots have three young flying : "*Darenth-Hulme*," the Green Imperial Pigeons have one young one three weeks old ; Common Mynahs, two flying : Sqd.-Ldr. C. Everitt, Black-crested Finches, two young flying : Major V. Dilwyn Jones, Red-bellied Conure, nest of five reared : R. G. Kirkham, Peach-faced Lovebirds, "now up to the waist in them" ! : C. M. Payne, three Derbyan Parrakeets flying : Captain R. S. de Q. Quincey, Shamas hatched two young, one of which soon died ; the female was killed by a Jay and the male unaided reared the survivor until fully fledged, when the latter, too, was killed by a Jay : R. C. J. Sawyer, Roulrouls laid nine eggs which were given to a bantam ; all were fertile but being rather stale only two hatched ; one young one was accidentally killed, but the other is now three weeks old : Wassenaar Zoo, Spur-winged Plover, four eggs, all hatched.

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Last year Mr. and Mrs. Eric C. Kinsey and Mr. and Mrs. William J. Sheffler made an extensive European tour. During their stay in England many members had an opportunity of meeting them. They especially will be very sorry to learn that since returning home Mrs. Kinsey's health has steadily deteriorated.

The Kinseys established " *Manorin* " thirty-two years ago, and built up very considerable collections of birds, camellias, and orchids. Unfortunately, the time came when Mrs. Kinsey found the strain of supervising the collections too great and it thus became necessary to dispose of them and the property at Manor. And so, in the words of Mr. Kinsey, " Manorin is no more."

A. A. P.

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REVIEWS

DAS BUCH VOM WELLENSITTICH. By CURT AF ENEHJELM. Edited by Dr. JOACHIM STEINBACHER. Verlag Gottfried Helène, Pfungstadt, Darmstadt, Germany. Price 21.50 DM. (approx. 36*s*.).

Curt af Enehjelm, Director of the Helsingfors Zoo, is well known to all readers of the AVICULTURAL MAGAZINE both for his achievements in the field of aviculture and for his articles on the subject. This " Book of the Budgerigar " has been produced with the assistance of Dr. Joachim Steinbacher and, as might be expected, this collaboration between two such well-known aviculturists has resulted in a most comprehensive and informative work. Every aspect is dealt with, starting with a description of the species *Melopsittacus undulatus* Shaw in the wild, the history of its early importations and first breedings, and the development of the varieties from the first mutation known, in Belgium in 1872, to the countless colours which are available to-day. The chapter on housing deals fully with cages, aviaries, and flights and is illustrated with photographs, drawings, and diagrams. Advice is given on buying birds, the points to look out for and avoid being clearly given, and the author emphasizes that the cheapest bird is seldom the best. His recommendations on how to treat birds during the period immediately after purchase is particularly helpful. He also says that in buying Budgerigars it should be borne in mind for what purpose they are required, whether as a pet, for the pleasure of keeping a few birds, or for breeding. He states that, as with all breeding of animals, it is better to start in a small way with first-class specimens.

In the chapter on breeding the following aspects are dealt with—choice of birds, breeding season, number of broods, pairing, laying of eggs, and brooding, young, control of nests, foster-parents, rings and the keeping of a record book, and points out the importance of the latter. There are also chapters on feeding and care of Budgerigars, moult, illness, " French moult," tame and speaking birds, and keeping Budgerigars with other birds. Finally, there is full information on colour breeding which occupies more than half the entire book.

There are 6 coloured plates, each depicting two varieties, by the English artist, A. Vowles and 41 black and white illustrations.

P. B-S.

WILDFOWL OF THE BRITISH ISLES. By PETER SCOTT and HUGH BOYD. Country Life, London, 1957. Price 21*s*. net.

There is no doubt that the group of birds popularly known as Wildfowl, which includes the swans, geese, and ducks, has become much more popular in recent years than was the case formerly, when most people thought of a wild goose or duck only as something to be shot and eaten. This increased interest is due, no doubt, to the very fine pictures one sees nowadays of the various species, drawn by the few artists who specialize in the painting of these birds ; and in the establishment of the Wildfowl Trust and its grounds at Slimbridge where the finest collection of wildfowl is to be seen. Very few people have an idea of the number and variety of species of these birds that occur in our own country and a book dealing with them was much to be desired. Such a book would not be of much value unless it were well illustrated, and with pictures in colour ; and it must include all the species that occur in Britain.

Such a book has now appeared and we welcome *Wildfowl of the British Isles*, by Peter Scott and Hugh Boyd, as adequately filling a gap, for it contains a full description of plumage, nesting habits, and range, as well as a first-rate coloured illustration, of every species, even including some that are only occasional visitors and some, such as the Mandarin Duck and Canada Goose, which were introduced but have become established with us. There are fifteen coloured plates, some containing three or more species, all drawn by Peter Scott, and although we have seen some of these before in his very excellent Reports of the Wildfowl Trust, they are none the less welcome in this compact form.

The only fault we have to find with an otherwise excellent book is the absence of an index, of which the Table of Contents does not quite take the place.

D. S-S.

THE RING. Edited and published by Dr. W. RYDZEWSKI, Croydon, England. Subscription, 1957, 16*s*. or 2.50 U.S. dollars.

This private publication was started in 1954 and has now attained a circulation in most countries of the world where bird banding is carried on. It is issued quarterly and is devoted entirely to bird banding, its aims, tasks, results, and methods, and is a useful medium for the exchange of ideas and experience. General articles on banding in various countries have been included, and also notes on trapping techniques, records of longevity, etc. Up to date eleven issues have appeared, including two for 1957. Subscriptions and requests for back numbers should be addressed to the Editor, Dr. W. Rydzewski, 1 Altyre Road, Croydon, Surrey. P. B-S.

NOTES

Notes on a Collection of Parrots

The following notes on my birds may possibly be of interest to some of our readers. Starting with the successes :—

Roseate Cockatoos.—The cock of this pair is one of the late Duke of Bedford's split-albino Roseates and was obtained from Mrs. Clark, of Maidsmere. Last year the hen laid three eggs, and reared three beautiful youngsters, one of which is an albino. It is white where the normal is grey, its breast is a lovely pink flecked with white, giving a pearl effect, the under-wing feathers are very deep pink—nearly red, it has the red eye, a flesh-coloured beak and feet. From what records I have been able to look up, I believe this is the first albino Roseate to be reared in captivity.

Leadbeater's Cockatoos, reared three youngsters.

Blue Ring-necks, reared two youngsters.

Lutino Ring-necks, reared three youngsters.

Turquosines, reared three.

Splendids, reared one.

Illiger's Macaws, laid three eggs, all were fertile, but did not hatch.

Pileated, hatched two youngsters which lived for three weeks but died of cold when the hen stopped brooding.

Brown's, had three youngsters in the nest on the 2nd March, but all died on the night of the 15th March, when we had snow and 19° frost.

Crimson-wings, laid three eggs, two were fertile but did not hatch.

Derbyans, laid two eggs which proved infertile.

Amazon Parrots, laid two eggs which proved infertile. I am afraid the hen is too old for any further breeding successes.

An interesting happening was that three 1955 bred lutino Ring-necks developed their pink rings ; two of these birds were bred by Mr. E. N. T. Vane, the other by Mrs. Clark.

At the time of writing the Cockatoo population at Mount Pleasant is as follows :—seven Leadbeater's, four Citron-crested, seven Roseates, two Gang Gangs, and one Lemon-crested.

Arthur Lamb.

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CORRESPONDENCE

SEXING SOFTBILLS

How does one sex softbills ? Raymond Sawyer returned my other Rothschild's Grackle two weeks ago, and when I put them together they looked as obvious a pair as one could imagine. To confirm this my old bird sang like mad, and they preened each other and he started breaking off twigs in a most business-like manner. Then the " hen " began to pursue the " cock " in a rather half-hearted way and he looked quite dejected. A few days ago the " cock " began to pursue the hen in a decidedly purposeful way, and later I rescued the hen from the ground, luckily before there was any real damage done to her. I still think they are a pair ! ! As Frost says, these grackles, sing, mate, or fight, quite irrespective of sex.

Tom Spence.

Dunbog,
Newburgh, Fife,
Scotland.